

## Effectiveness of Sheep Grazing of the Invasive Giant Hogweed at Kirkside Farm, Macduff, Aberdeenshire

*2019 progress report - A Robinson and R Van der Wal, University of Aberdeen*

### Introduction

This trial project is a practical experiment to investigate if and how land managers could best use sheep to control substantial Giant hogweed (*Heracleum mantegazzianum*) infestations – in this case in a woodland site – with a view to preparing practical advice for land managers. Where Giant hogweed has taken over in an area it can be difficult, time consuming and expensive to tackle the problem and requires the use of herbicides. This study has been assessing the opportunity of using sheep to control Giant hogweed in a trial site at Kirkside Farm near Macduff at the bottom of the River Deveron catchment.

This trial is part of the Scottish Invasive Species Initiative (SISI) and where the Deveron Rivers Trust, Aberdeen University and Kirkside Farm have been working together to assess:

- the impact of sheep grazing on the volume of Giant hogweed throughout the site, and
- the impact of the sheep grazing on the rest of the vegetation

By monitoring and recording our work we intend to write a good practice guide for land managers who may wish to control invasive plant problems through sheep grazing.

### Macduff site

The site in Macduff is part of Kirkside Farm on the right bank of the Deveron near Macduff distillery. It is a strip of mature woodland with an access road between it and the River Deveron (Grid reference: NJ688626). The site is well known for having large amounts of Giant hogweed is popular with dog walkers and is opposite a golf course.

Due to the scale of Giant hogweed infestation and the difficult terrain of the site previous chemical control actions were ineffective, time consuming and expensive. Therefore, we wanted to find a more effective approach to Giant hogweed control here. After successes in using sheep to control Giant hogweed elsewhere in the Deveron catchment at Auldtown Farm, the landowners at Kirkside were keen to try using sheep on the site as the extent of Giant hogweed was increasing there was concern about public health implications given its recreational popularity.

The site allows an assessment of the effectiveness of sheep grazing in a radically different setting (mature woodland) compared to a previous study site at Auldtown.

### Sheep and grazing regime

Twenty-six sheep were put onto the site on 12<sup>th</sup> April 2019 (Table 1). The sheep were initially reluctant to tackle the Giant hogweed and so were contained in an area by the farmhouse (until 23<sup>rd</sup> April) to allow them to familiarize themselves with the site and available grazing and before being released onto the wider site.

As the year progressed, the sheep became more confident in their surroundings and wandered freely around and across the site. Through speaking with the farmers and members of public who use the site it was reported that the sheep developed something of a daily routine whereby in the morning they would spend their time at the northern end of the site and then in the evening spend more time by the road and farm.

Table 1: The number of sheep and duration they spent within the trial site

Year	Start	End	Sheep put on	Sheep taken off	Sheep days (estimated based on 25 sheep)
2019	12/04	01/11	26	25	5075

## Monitoring

### a) Giant hogweed

The density and spatial distribution of Giant hogweed plants was monitored to assess whether and the extent to which sheep grazing was affecting number of Giant hogweed plants.

Monitoring plots were stratified along the top of the site at approximate 15m intervals. Forty-two (42) plots were established in total as shown in Figure 1 (blue circles). Each 1m<sup>2</sup> plot was permanently marked using metal stakes and their position recorded using GPS, to allow repeat surveys to be undertaken at each location and the accurate recording of change.

At each plot:

- Photos of the plot and surrounding area were taken to enable relocation and monitoring of change in Giant hogweed cover and vegetation change.
- Vegetation height was recorded at 3 points within the plot as well as recording the main vegetation types to allow detection of change in the vegetation composition.
- The number of Giant hogweed plants/seedlings were recorded in the 1m<sup>2</sup> plot.
- In addition, to investigate further the density and spatial distribution of Giant hogweed plants, additional counts were made in adjacent 1 m<sup>2</sup> quadrats (to the right and below, creating 4 x 1 m<sup>2</sup>).

The plots were surveyed on 11<sup>th</sup> June and 01<sup>st</sup> October 2019.

### b) Habitat / vegetation monitoring

Habitat recording undertaken is based on the methodology used as part of the Repeat Woodland Bird Survey (RWBS) (Amar *et al.*, 2006).

Habitat recording was undertaken at seven points as shown in Figure 1 (orange circles), spaced approximately 150m apart with no point less than 50m from the edge of the wood. Four (4) points were distributed along the south of the site with two (2) along the lower half above the track and one (1) in the paddock area at the entrance of the site.



Figure 1: Hogweed monitoring plots (blue markers) and vegetation monitoring plots (orange markers) at the Macduff trial site.

Each habitat survey point is the centre of a 25m radius area within which habitat recording took place. Some measurements were recorded from the centre of the 25m plot, whilst others were recorded in four 5m radius sub-plots centred 12.5m north, east, south and west of the centre of the plot. The centre point and the four 5m radius sub-plots were marked with a metal stake to allow easy relocation. The recording took place on 26<sup>th</sup> June and 02<sup>nd</sup> October 2019.

Presence of sheep paths, streams and the dominant tree and herb species were recorded, as well as browsing pressure at the plot level.

### Subplot level information

At each of the four subplots the following were recorded:

Horizontal Visibility (assessed to gauge openness of the site).	A 2.4m pole marked with alternate black sections was placed in the centre of the plot and viewed from the centre of each subplot. The number of black bands that were at least 50% visible through the vegetation (maximum 12) was recorded. This method is described in detail in Wilson et al. (2005).
Canopy cover	% canopy cover overall over the plot
% vegetation cover in ht classes (0.5-2m, 2-4m, 4-10m)	Total cover by veg of the 5m subplot as if viewed from above, considering only the vegetation in each height band in turn
Field layer cover	% cover of each of the following - bracken, herb, grass, moss, leaf litter/wood, rock, bare ground, salmonberry, wood rush, hogweed, dead hogweed stems, nettle, other. Note % herb excludes nettle
Presence of shrub species	Shrubs under 5m high only
% shrub species grazed - Elder, Salmonberry, Ash, Sycamore	For woody stems <2m high: none present, light browsing, moderate browsing, heavy browsing
Level of Hogweed grazing	light browsing, moderate browsing, heavy browsing

## Results

### a) Giant hogweed

At the first monitoring visit on 12<sup>th</sup> June, 90 days after the sheep went on the site, there were already signs of heavy grazing of Giant hogweed plants. By 01<sup>st</sup> October, 202 days after the sheep went on site, most of the large Giant hogweed plants were all grazed and gone with only small seedlings remaining (Figures 2 and 3).

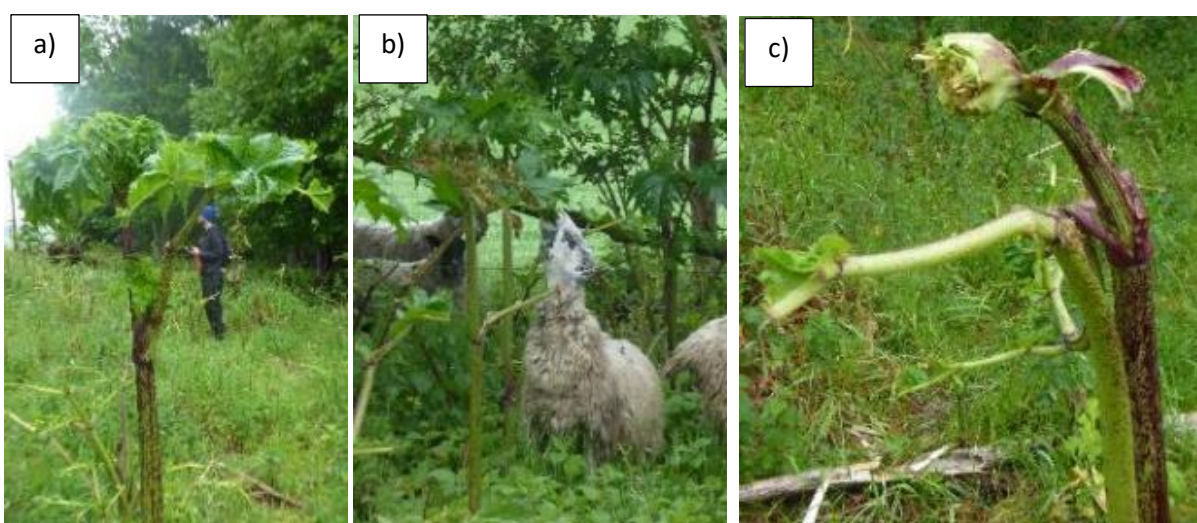


Figure 1: a) Giant hogweed plants >2m, b) Sheep reaching up to graze Giant hogweed plants, c) Grazed Giant hogweed plants.

There were on average 13 Giant hogweed seedling/plants per plot in June and this dropped to 5 by October. A total of 1371 seedlings were recorded in the plots across the whole site in June compared to 501 in October.



*Figure 2: Dramatic changes in Giant hogweed cover occurred after 6 months of grazing by sheep as shown in Plot 24.*

#### **b) Habitat / vegetation change**

Across the site large vegetation changes were detected.

Although the average vegetation height did not change over the grazing period there were observed changes in the vegetation composition with an increase in grass and nettles recorded alongside the reduction in Giant hogweed. Salmonberry, Hedge Woundwort and Ash seedlings had been grazed and across all sites there was an increase in bare ground in the 1m<sup>2</sup> plot from 47% to 59%.

The photos in Figures 4-7 show some of the most dramatic changes in both Giant hogweed cover and vegetation change. In these we are already seeing increased dominance of highly defended plant species such as nettles which are less palatable to sheep and therefore increase in abundance when grazing occurs.



*Figure 3: Plot 8 where sheep congregate - loss of hedge woundwort, grazed grasses plus sheep pellets.*



Figure 4: Plot 13 shows dramatic loss of Giant hogweed. Close up shows small Ash seedlings gone too.



Figure 5: Plot 16 showing Giant hogweed been replaced with stinging nettle.



Figure 6: Plot 20 showing mass of Giant hogweed seedlings emerging, but all large Giant hogweed plants gone.

Across the seven plots there was a slight increase in the horizontal visibility. This is in part due to a reduction in Giant hogweed. In June, 19 out of the 28 sub-plots had Giant hogweed, with nine (9) plots having 10% or more hogweed cover. By October only nine (9) of the sub-plots had Giant hogweed (maximum cover of 10%). In addition Salmonberry bushes were mostly lightly grazed in June but by October were showing moderate to heavy levels of browsing.

The amount of bare ground had increased from an average of 24% to 39%. Many plots had extensive sheep paths through them.

There has been a reduction in herb cover in most plots but the plot nearest the farmhouse (vegetation plot 4), which had been sprayed with herbicide in spring 2019, showed an increase in both grass and herb cover. The area around vegetation plot 1 where the sheep congregate and the paddock area (vegetation plot 7) both showed an increase in nettles and, in the paddock area, thistles were appearing. At vegetation plot 1, as well as Giant hogweed and Hedge woundwort being heavily grazed stinging nettles and bracken had also been grazed indicating high grazing pressure (Figures 8 and 9).



*Figure 7: Vegetation plot 1 - Hedge woundwort heavily grazed. Increase in nettles.*



*Figure 8: Even bracken and stinging nettles have been grazed showing very high grazing pressure.*

Grazing pressure was less just above the access track as shown in the photos of vegetation plot 5 (Figure 10). There is, however, heavy grazing of Salmonberry and Hedge woundwort in places.

Sheep paths are appearing where the sheep make their way from the road to the south east of the site. From observations and speaking to people who visit the site it was reported that the sheep make their way from the paddock along the south-east of the site in the morning near the field boundaries, spending some time around vegetation plot 1. Later in the day and evening the sheep can be seen around the lower half of the site and around the road.



*Figure 9: Photos of vegetation plot 5 in June and October.*

## **Recommendations**

The introduction of twenty five sheep over a period of seven months at Kirkside Farm has resulted in a massive reduction in Giant hogweed but also in the site becoming heavily overgrazed to the detriment of other parts of the plant community. Consequently, there are extensive areas of bare ground, grazing of shrubs and saplings and quite large changes in ground flora apparent.

It is expected that, because of the increase in bare ground, in spring 2020 an explosion of Giant hogweed seedlings will take place as plants emerge from the extensive seed bank at the site.

It is recommended that a smaller number of sheep are introduced in 2020 – between 10 - 15 sheep – and that grazing should take place from April to August at the most.

We know, from video footage and field observation, that sheep will tackle large Giant hogweed plants by rubbing and knocking them over before grazing and so we do not need to start grazing in early Spring – the animals will happily tackle larger plants later in the season.

## **Acknowledgements**

We would like to thank the Gordon family of Kirkside Farm for their willingness to be involved with this trial and also thank members of the public for respecting the sheep while walking and exercising (with and without their dogs) along the public access track.

## **References**

Amar, Arjun & Hewson, C & Thewlis, R & Smith, Ken & Fuller, Robert & Lindsell, Jeremy & Conway, Greg & Butler, Simon & Macdonald, M. (2006). What's Happening to Our Woodland Birds? BTO Research Report 169/RSPB Research Report 19